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SUMMARY OF DR. NIRENBERG'S RESEARCH

Dr. Nirenberg and his coworkers studied the steps that relate DNA, RNA, and protein. They showed that messenger RNA is required for protein synthesis and that synthetic oligo - and polyribonucleotides have messenger activity. Over a five year period they deciphered the genetic code.

Dr. Nirenberg then began to work in the field of developmental neurobiology. He and his colleagues established many clonal lines of mouse neuroblastoma cells and somatic hybrid cells that express neural properties in culture, and cell lines were found that form synapses in culture with striated muscle cells. The cell lines were given to many investigators and now are widely used as model systems for studies in neurobiology and related fields. Nirenberg and his coworkers found that synaptogenesis and other neural properties are regulated by cAMP. Prolonged elevation of cellular cAMP levels shifts the cells to a more differentiated state that enables the cells to form synapses. cAMP was found to activate the expression of a gene for an L-type voltage-sensitive calcium channel α-1 subunit that is required for stimulus-secretion coupling at synapses. The calcium channel gene was cloned and sequenced and factors that regulate the expression of this calcium channel gene, which have long term effects on the efficiency of transynaptic communication, are being studied currently.

In addition, Dr. Nirenberg and his coworkers recently have cloned and sequenced Drosophila or mouse genomic DNA or cDNA for 10 novel homeobox genes or Pou box-homeobox genes. These genes code for proteins that bind to DNA and thereby regulate gene expression. Current studies center on defining the functions of these genes during

the development of the nervous system.

Dr. Nirenberg has received many honors and awards including the Nobel Prize in Medicine.